Nematology Circular No. 123
October 1985

Fla. Dept. Agric. & Consumer Serv.
Division of Plant Industry

ROOT-KNOT NEMATODES IN GLADIOLUS CORMS

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Gladiolus (Gladiolus x hortulanus L. H. Bailey) grown in Florida provide 90 percent of the flower spikes available in the United States from October through May. In 1984, 80 million stems, valued at $15 million, were marketed from Florida, representing 68 percent of the United States' production.

BACKGROUND: Both corms and cormels are planted in Florida: corms for cut flower production, cormels for production of new corm stocks. Corms and cormels are dug, cured, cleaned, and stored in controlled environments prior to planting in the following crop season.

Endoparasitic root-knot nematodes Meloidogyne incognita, M. incognita acrita, M. arenaria, M. javanica (4), M. hapla (5), and M. thamesi (1) not only attack roots of gladiolus during the growing season, but also invade the daughter corm, stolons, and cormels as these appear during crop development. Nematodes, harbored in the corms and cormels, survive post-harvest handling practices and become active when the stock is replanted.

THE DISEASE: Orientation of the root-knot nematode in the gladiolus corm (Fig. 1) is displayed in Figures 2-12. Gross examination in the field does not permit an investigator to detect the juvenile stage which enters the plant tissue. However, the female and egg masses can be located on the leaf base at the point of attachment with the aid of a hand lens (Fig. 1,5), in the corm near the leaf node (Fig. 6,10, 11), and near the rootring (Fig. 2,4) in the periderm separating mother and daughter corm. The mature female appears as a pear-shaped, pearl white body about .50 to .80 mm in length, and is easily disengaged from surrounding tissue (Fig. 3).

Root-knot nematodes are pathogenic to gladiolus, reducing flower production, size of daughter corms, number of cormels produced, and enhance the severity of corm rots. Infected corms are often spongy in texture and difficult to clean after digging. Similar to a problem associated with Fusarium oxysporum f. gladioli, nematode infection near the root ring (Fig. 2,4) interferes with proper development of the abscission layer between mother and daughter corm (Fig. 6).

Tumors (nematode galls) appear at the corm nodes (Fig. 6) beneath the husk, often developing open lesions (Fig. 7,8) which petrify during storage and produce a white chalky tissue in which the dried female may be identified (Fig. 9).

Females are visible with a hand lens on the periphery of necrotic lesions of the leaf node (Fig. 10,11). Thin crosssectional slices of the storage tissue reveal eggmasses deposited by the female into a gelatinous matrix exuded into corm tissue (Fig. 12).

Nematode detection in corms harvested during hot weather in Florida is complicated by the presence of Fusarium corm rot. The nematode intensifies the severity of the disease complex so that corms are not retrieved from the soil or are considered culls.

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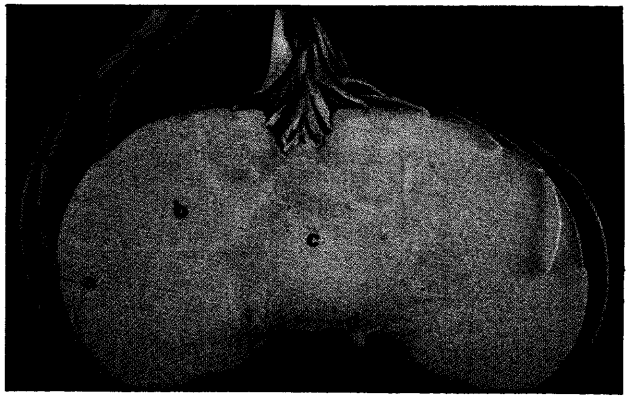

Fig. 1. Cross section of mature gladiolus corm showing the (a) leaf attachment to the corm, (b) storage stem tissue, (c) pith, and (d) periderm scar where the mother corm was separated at curing.

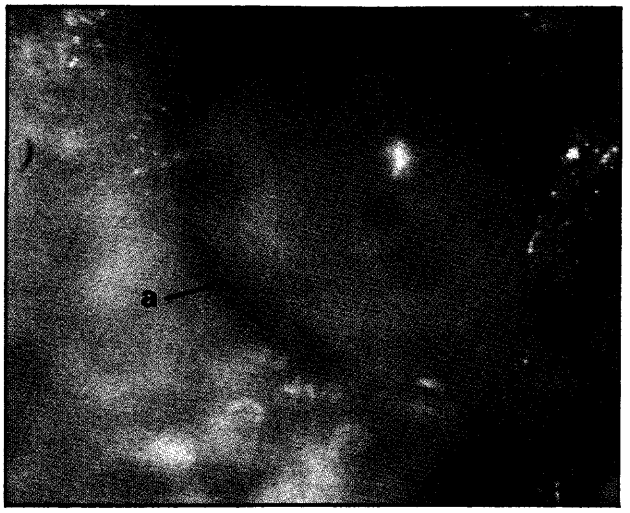

Fig. 3. Adult female root-knot nematode (a) with head, (b) embedded in corm tissue.

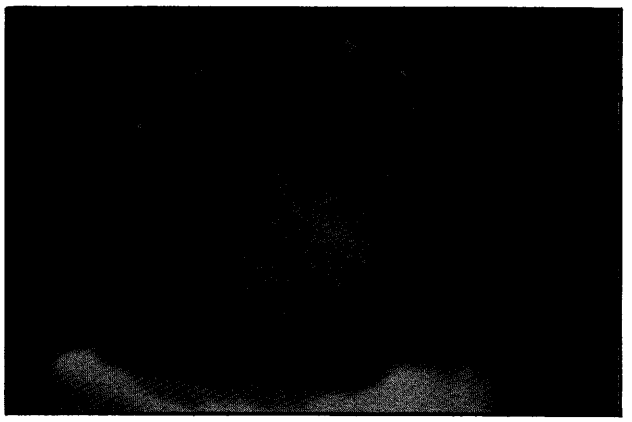

Fig. 5. Female root-knot nematodes (n) on the midvein of a leaf at the corm interface.

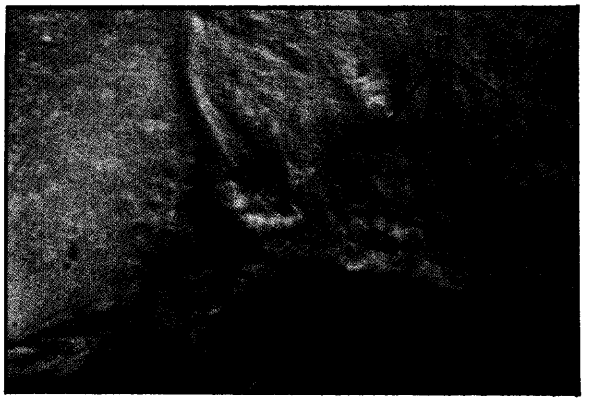

Fig. 2. Magnified terminal or pith root-knot nematodes (n) in the periderm area of the daughter corm.

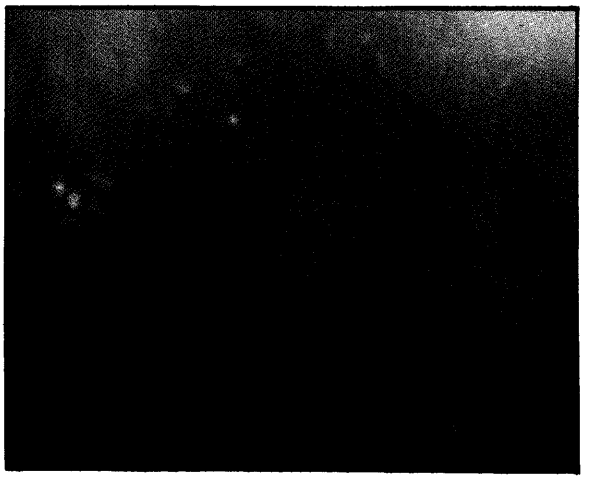

Fig. 4. Concentration of female root-knot nematodes (n) in the disorganized tissue of the root scar.

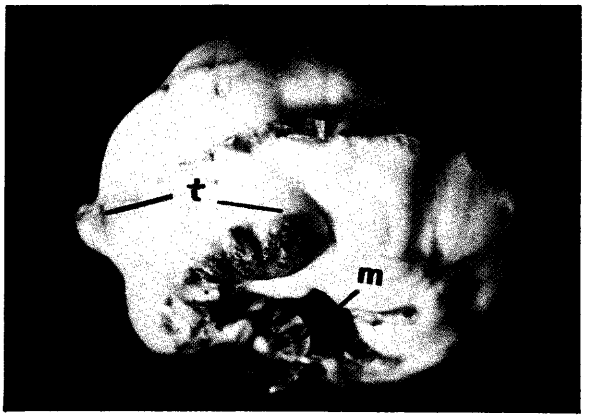

Fig. 6. Corm from which the leaves (husk) have been removed to show tumors (t) associated with root-knot nematode infection at the leaf nodes and the remnants of the mother corm (m).

Fig. 7. Corm showing necrotic lesions of the corm node associated with root-knot nematode infection.

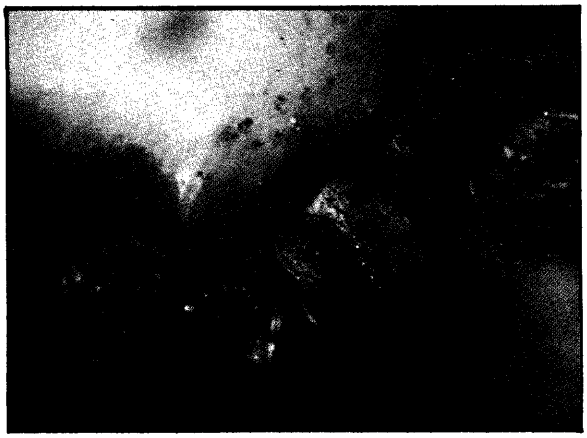

Fig. 8. Close-up of necrotic area in which root-knot females are located.

Fig. 9. Dehydrated females may be detected within the petrified tissue of a damaged corm node (n).

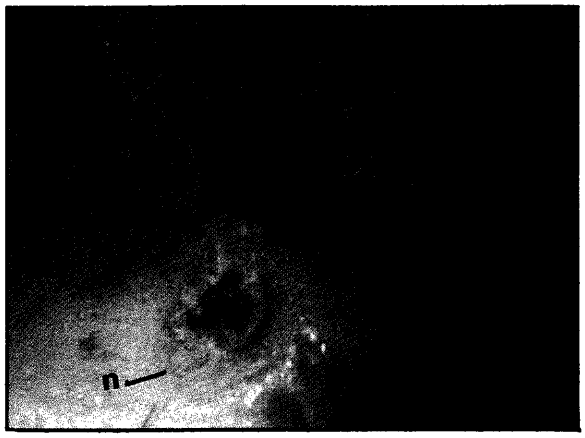

Fig. 10. Female (n) located under a shallow flap cut at the periphery of a necrotic lesion on a corm node.

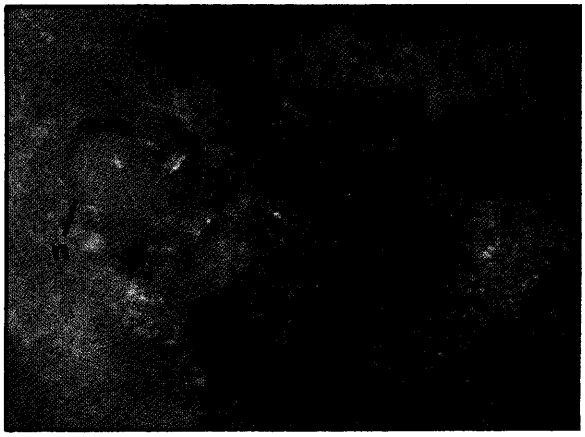

Fig. 11. Close-up showing orientation of the nematode (n).

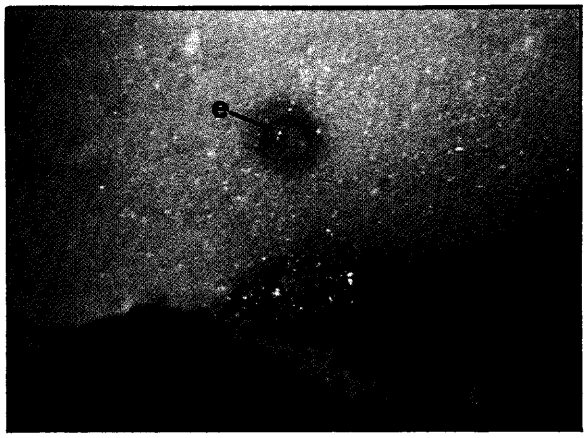

Fig. 12. A fresh slice (approximately 0.5 mm) of the corm shows a section of the gelatinous egg mass (e) deposited in the tissue by a female.

CONTROL: Hot-water treatment for 30 minutes at temperatures ranging from 133 to 139 F (56 to 59 C) controls root-knot nematodes infecting the cormels and small corms of gladiolus (2). Flowering size corms, however, do not tolerate the temperatures required for control. Treatment procedures and choice of temperature levels dependent on the production season, the stage of dormancy, and size of the corms or cormels are given by Magie et al. (3).

LITERATURE CITED:

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Contribution No. 197, Bureau of Nematology